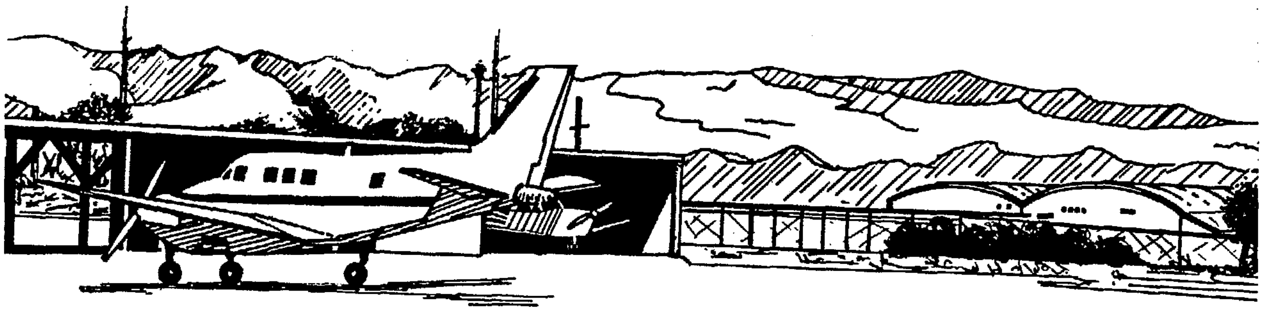
CHAPTER THREE
FACILITY REQUIREMENTS



Chapter Three
FACILITY REQUIREMENTS

To plan for the future of Kingman Airport, it is necessary to translate forecast aviation demand into the specified types and quantities of facilities that will adequately serve these needs. This chapter uses established planning criteria to determine the airside (i.e., airfield capacity, runways, taxiways, navigational aids, marking and lighting), and landside (i.e., hangars, terminal building, aircraft parking apron, fueling, automobile parking and access) facility requirements.

Two fundamental planning procedures are utilized in the facility requirements analysis: the demand capacity analysis, and the determination of airport development needs. The objective of this effort is to identify deficiencies in existing facilities and outline which new facilities will be needed to accommodate forecast demands. Having established the facility requirements, alternatives for providing necessary facilities will be evaluated to determine the most cost-effective and efficient means for implementation.

AIRFIELD CAPACITY

METHODOLOGY

A variety of techniques have been developed for the analysis of airfield capacity. The current methodology, accepted by the Federal Aviation Administration (FAA) and employed in this study, is based on FAA Advisory Circular 150/5060-5, **Airport Capacity and Delay.** With this methodology, airfield runway capacity is described by the following three terms.

- **Hourly Capacity of Runways:** The maximum number of aircraft operations that can take place on the runway system in one hour.

- **Annual Service Volume:** The annual capacity or a maximum level of annual aircraft operations that may be used as reference in planning the runway system.

- **Annual Aircraft Delay:** The total delay incurred by all aircraft on the airfield in one year.

The capacity of an airport is determined by several factors. Among these are airfield layout, meteorology, runway use, aircraft mix, percent arrivals, percent touch-and-gos and exit taxiway locations. Each of these elements and its impact on airfield capacity is discussed in the following paragraphs.

Airfield Layout

The airport layout refers to the location and orientation of runways, taxiways, and the terminal area. As illustrated on **Exhibit 1C**, the layout of Kingman Airport consists of the primary Runway 3-21 and a crosswind runway, Runway 17-35, which intersect at a point near Runway 17 and 21 ends. Runway 3-21 has a full parallel taxiway and three taxiways that qualify as *exit* taxiways. Runway 17-35 has a partial parallel taxiway and a maximum of two *exit* taxiways. The commercial service terminal, the fixed base operators, hangars and shades are all located west of the runways.

Meteorology

Weather conditions can affect runway utilization due to changes in cloud ceilings and visibility. When weather conditions deteriorate below visual flight rule conditions, the instrument capability of the airport becomes a factor in determining airport capacity. During instrument flight rule conditions, separations between aircraft increase in length and the capabilities of the airfield system to accept operations is reduced.

The **Airfield Capacity and Delay** Advisory Circular (AC 150/5060-5) recognizes three categories of ceiling and visibility minimums. Visual Flight Rule (VFR) conditions occur whenever the cloud ceiling is at least 1,000 feet above ground level and the visibility is at least 3 statute miles. Instrument Flight Rule (IFR) conditions occur whenever the reported cloud ceiling is at least 500 feet but less than 1,000 feet and/or visibility is at least one statute mile but less than three statute miles. Poor Visibility and Ceiling (PVC) conditions exist whenever the cloud ceiling is less than 500 feet and/or the visibility is less than one statute mile.

At Kingman Airport, VFR conditions occur approximately 95 percent of the time. There is no data available on the annual percentage of IFR and PVC conditions at the airport but it is expected to be minimal based upon the typical weather associated with this region.

Wind conditions are of prime importance in determining runway use and orientation. Where prevailing winds are consistently from one direction, runways are generally oriented in that direction. In most areas, however, consistency of wind direction is not found. In such instances, a multiple runway system may be required. The Federal Aviation Administration (FAA) has established guidelines indicating that an airport runway system should provide 95 percent usability of the runway, with 12 mile-per-hour (mph) crosswind components for non-jet aircraft less than 12,500 pounds and 15 mph crosswind components for all other aircraft.

A crosswind analysis was prepared as part of this master plan. Data necessary for conducting wind analyses were obtained from the airport's wind rose. Wind data for all-weather conditions are represented on the wind rose, **Exhibit 1B**, in terms of the percentage of time winds of different velocities blow from various directions.

Analysis of the wind rose revealed that aircraft can operate on either runway and obtain the necessary 95 percent coverage of the 15 mph crosswinds. Both runways combined provide better than 95 percent coverage of the 12 and 15 mph crosswinds (**Table 3A**).

TABLE 3A
Crosswind Coverage
Kingman Airport

Runway	Percent Coverage 12 MPH Crosswinds	15 MPH Crosswinds
3/21	95.5	97.6
17/35	89.3	95.1
Combined	98.6	99.3

Runway Use

Runway use is expressed in terms of the number, location, and orientation of active runways. It involves directions and the kinds of operations using each runway. Estimated runway usage based on an analysis of daytime Unicomm logs obtained from the airport for the period 1989-1990 is listed below.

TABLE 3B
Runway Usage
Kingman Airport

Runway	Percent Use
3	42%
21	48%
17	1%
35	9%

Aircraft Mix

The airside capacity methodology identifies four classes into which aircraft are categorized. Classes A and B include small propeller aircraft and jets, weighing 12,500 pounds or less. Classes C and D consist of large jet and propeller aircraft generally associated with airline and military use. The aircraft operational mix used in calculating the capacity of Kingman Airport, based upon the forecasts of aviation demand, is presented in Table 3C and illustrated on **Exhibit 3A**.

TABLE 3C
Aircraft Operational Mix Forecast
Kingman Airport

Year	Aircraft Classification A	B	C	D
1995	68%	16%	16%	0%
2000	67%	16%	17%	0%
2005	66%	16%	18%	0%
2010	65%	16%	19%	0%

Typical Aircraft by Classification:

Class A: Small single-engine, gross weight 12,500 pounds or less weight 12,500 pounds or less

Examples:

Cessna 172/182	Mooney 201
Beech Bonanza	Piper Cherokee/ Warrior

Class B: Small, twin-engine, gross weight 12,500 pounds or less

Examples:

Beech 1300	Mitsubishi MU-2
Cessna 402	Piper Navajo
Lear 25	Rockwell Shrike
Beechcraft 99	Cessna Citation

Class C: Large aircraft, gross weight 12,500 pounds to 300,000 pounds

Examples:

Douglas DC-9	Beech King Air 200
Boeing 727	Boeing 737
Boeing 757	Boeing 767
Gulfstream III	Citation II
DeHavilland DH-8	Lear 35/55
Swearingen Metro	Beech 1900

Class D: Large aircraft, gross weight more than 300,000 pounds

Examples:

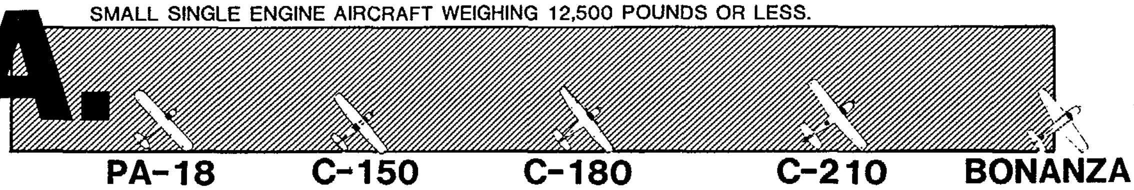
Lockheed L-1011	Douglas DC-8-60/70
Boeing 747	Airbus A-300/A-310

90MP01-3A-1/3191

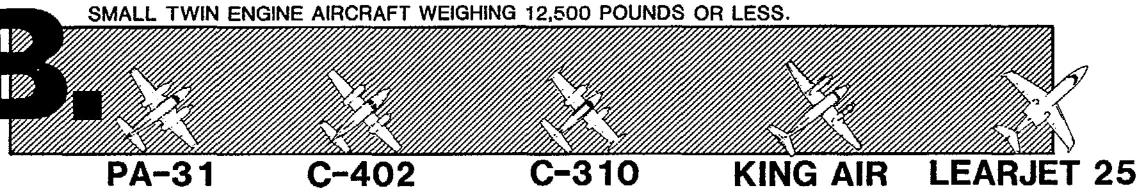
AIRCRAFT CLASSIFICATIONS

AIRCRAFT CLASSIFICATION	REPRESENTATIVE TYPES OF AIRCRAFT DESCRIPTION

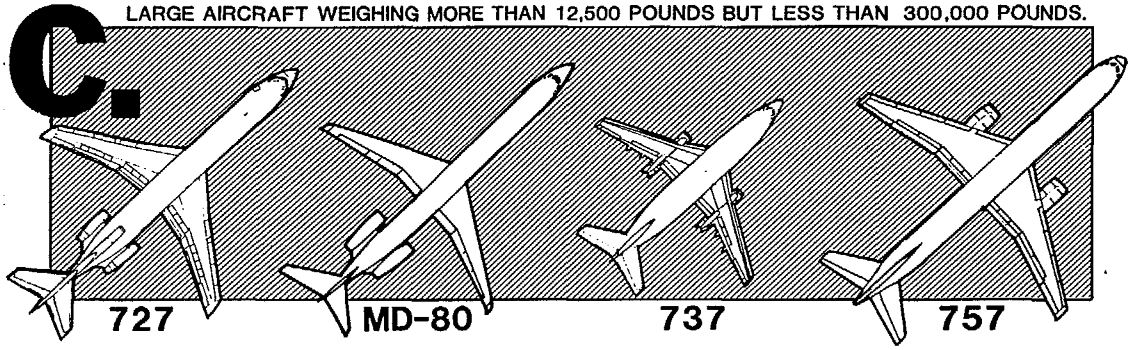
A. SMALL SINGLE ENGINE AIRCRAFT WEIGHING 12,500 POUNDS OR LESS.



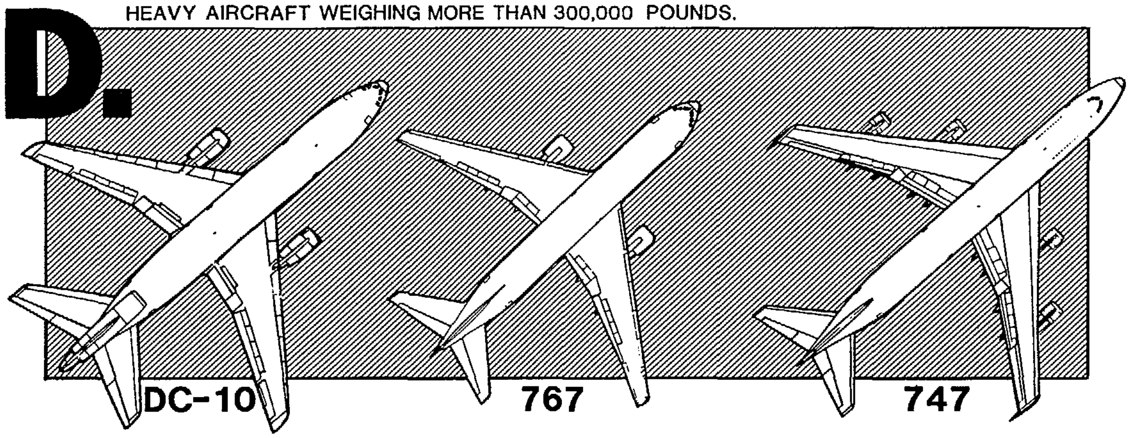
B. SMALL TWIN ENGINE AIRCRAFT WEIGHING 12,500 POUNDS OR LESS.



C. LARGE AIRCRAFT WEIGHING MORE THAN 12,500 POUNDS BUT LESS THAN 300,000 POUNDS.



D. HEAVY AIRCRAFT WEIGHING MORE THAN 300,000 POUNDS.



1. WEIGHTS REFER TO MAXIMUM CERTIFIED TAKE OFF WEIGHT.
2. HEAVY AIRCRAFT ARE CAPABLE OF TAKE OFF WEIGHTS OF 300,000 POUNDS OR MORE WHETHER OR NOT THEY OPERATE AT THIS WEIGHT.

KINGMAN
AIRPORT

Exhibit 3A
AIRCRAFT CLASSIFICATIONS

Percent Arrivals

The percent of arrivals has an influence on the capacity of runways. In most cases the higher the percentage of arrivals during the peak period, the lower the service volume. At Kingman, there was no information that indicated a disproportionate share of arrivals to departures during peak periods. Therefore, it was assumed that arrivals equal departures during the peak periods.

Touch-And-Go Operations

A touch-and-go refers to an aircraft which lands then makes an immediate takeoff without coming to a full stop or exiting the runway. These operations are normally associated with training, are classified as *local* operations, and are reported on the airport's Unicom records. Touch-and-go's now comprise approximately 10 percent of all operations at the airport. This percentage is expected to increase during the planning period.

Exit Taxiways

In addition to the runway configuration, the most notable characteristics considered in the airside capacity model, are the number and types of taxiways available to exit the runway. The location of *exit* taxiways affects the occupancy time of an aircraft on the runway. The longer a plane remains on the runway, the lower the capacity of that runway. The aircraft mix index determines the distance the taxiway must be located from the runway end to qualify as an *exit* taxiway.

The number of qualified exit taxiways depends upon the runway in use, from a minimum of one on Runway 17-35, to three on Runways 3 and 21. Only those exits located between 2,000 and 4,000 feet of the runways ends qualify as *exit* taxiways in the capacity analysis.

CAPACITY ANALYSIS

The preceding information was used in conjunction with the airside capacity model to determine the operational capacity at Kingman Airport. Three separate results were obtained from the analysis.

- Hourly Capacity of the Runway
- Annual Service Volume
- Annual Aircraft Delay

From these results, it is possible to determine the adequacy of the current airfield to accommodate potential demand scenarios and to determine the range of aircraft delay associated with each demand level.

Hourly Runway Capacity

The first step in capacity analysis involves the computation of an hourly runway capacity during VFR and IFR conditions. Because of increased separations required between aircraft under IFR, VFR hourly capacity is normally much higher. From these determinations, a weighted hourly capacity can be calculated.

The airfield capacity is influenced by the runway configuration. Parallel runway systems provide greater airport capacity than a single runway or two intersecting runways. As illustrated in Table 3D, the weighted hourly capacity for the existing runway is 89 operations. The VFR hourly capacity will vary between 87-93 operations throughout the planning period.

When ceiling and visibility decreases below VFR minimums, the capacity of the airport changes significantly. At Kingman Airport only one runway approach is equipped for straight-in instrument approaches. The IFR hourly capacity was determined to be 56 operations throughout the planning period.

Annual Service Volume

Once the hourly capacity is known, the annual service volume (ASV) can be determined. The ASV under VFR conditions was calculated by the following equation.

$$ASV = C \times D \times H$$

C = weighted hourly capacity
D = ratio of annual demand to average daily demand during the peak month
H = ratio of average daily demand during the peak month

The existing weighted hourly capacity (C) as determined earlier is 83 operations for Kingman Airport. The daily demand ratio (D) is determined by dividing the annual operations by average daily operations during the peak month. The hourly ratio (H) is determined as the inverse of the percent of daily operations occurring during the peak hour. As a general rule, planning for additional capacity should begin when an airport reaches approximately 60 percent of the ASV.

The existing ASV for Kingman Airport is 234,900 operations. This indicated that the airport was operating at approximately 12 percent of annual capacity in 1989 and could reach 24 percent by the year 2010, if no additional steps are taken to improve capacity. Although forecast demand is not greater than capacity, there are still delays associated with these levels of activity.

Annual Delay

Even before an airport reaches capacity, it begins to experience certain amounts of delay to aircraft operations. Delays occur to arrival traffic that must wait in the VFR traffic pattern or in the IFR holding pattern awaiting their turn to land. Departing traffic must hold on the taxiway or the holding apron while waiting for the runway and final approach to be cleared.

As an airport's operations grow toward capacity, delay increases exponentially. With 27,000 annual operations, Kingman Airport is currently at 12 percent of capacity. This translates to an average delay per aircraft of less than 0.1 minutes. Actual delays to individual aircraft can be as high as ten times this average value. At present operations levels, total aircraft delay at Kingman Airport is 32 hours annually. When the airport reaches the 56,800 level of operations forecast for 2010, delays will still average less than one minute per aircraft and will total only 142 hours annually.

Conclusions

Table 3D provides a summary of the operational capacity and delay analysis for Kingman Airport. The airport's operational capacity is not expected to become a constraining factor to the future growth of the airport.

TABLE 3D
Airfield Demand/Capacity and Delay Summary

Year	Annual Operations	Design Hour Operations	Weighted Hourly Capacity VFR	Weighted Hourly Capacity IFR	Annual Service Volume VFR	Annual Service Volume IFR	Avg Delay Per Operation (Minutes)	Total Annual Delay (Hours)
1995	37,800	18	89	56	232,300	128,000	< 1	32
2000	44,000	20	87	56	227,100	138,000	< 1	73
2005	50,200	23	93	56	242,700	144,000	< 1	126
2010	56,800	25	92	56	240,100	156,000	< 1	142

As shown, design hour and annual demand are not expected to exceed the weighted hourly capacity and annual service volume during the planning period, even during IFR conditions. As long as the delay to arriving and departing aircraft does not begin to approach three minutes per aircraft, a delay considered to be a significant detriment to aircraft operations, an increase in capacity at the airport is not justified. A seven percent increase in capacity could be obtained by constructing the necessary exit taxiways to increase the annual service volume to the maximum for this runway configuration.

Although an increase in runway capacity is not justified by the anticipated demand, planning for such an occurrence should be initiated when the annual demand approaches 60 percent of the annual service volume. As illustrated in **Exhibit 3B**, this point is not anticipated to occur during the planning period.

AIRSIDE FACILITY REQUIREMENTS

The results of the demand/capacity analysis conducted in the previous section, and established planning criteria are used to determine facility requirements for the airport. Airside facility requirements are those related to the arrival and departure of aircraft.

- Runways
- Taxiways
- Navigational Aids
- Marking and Lighting

The selection of the appropriate FAA design standards for the development of airfield facilities is based primarily upon the characteristics of the aircraft which are forecast to use the airport. The most important characteristics are the approach speed and the size of the critical design aircraft. The planning for future aircraft use is particularly important because the appropriate design standards must be applied to facilities in order to avoid costly relocations at a later date.

According to FAA Advisory Circular, AC 150/5300-13, **Airport Design Guidelines**, aircraft are grouped into five categories based upon their certified approach speed. These categories range from *Category A* for slower, single-engine piston aircraft to *Category E* for supersonic jet aircraft. Most of the aircraft

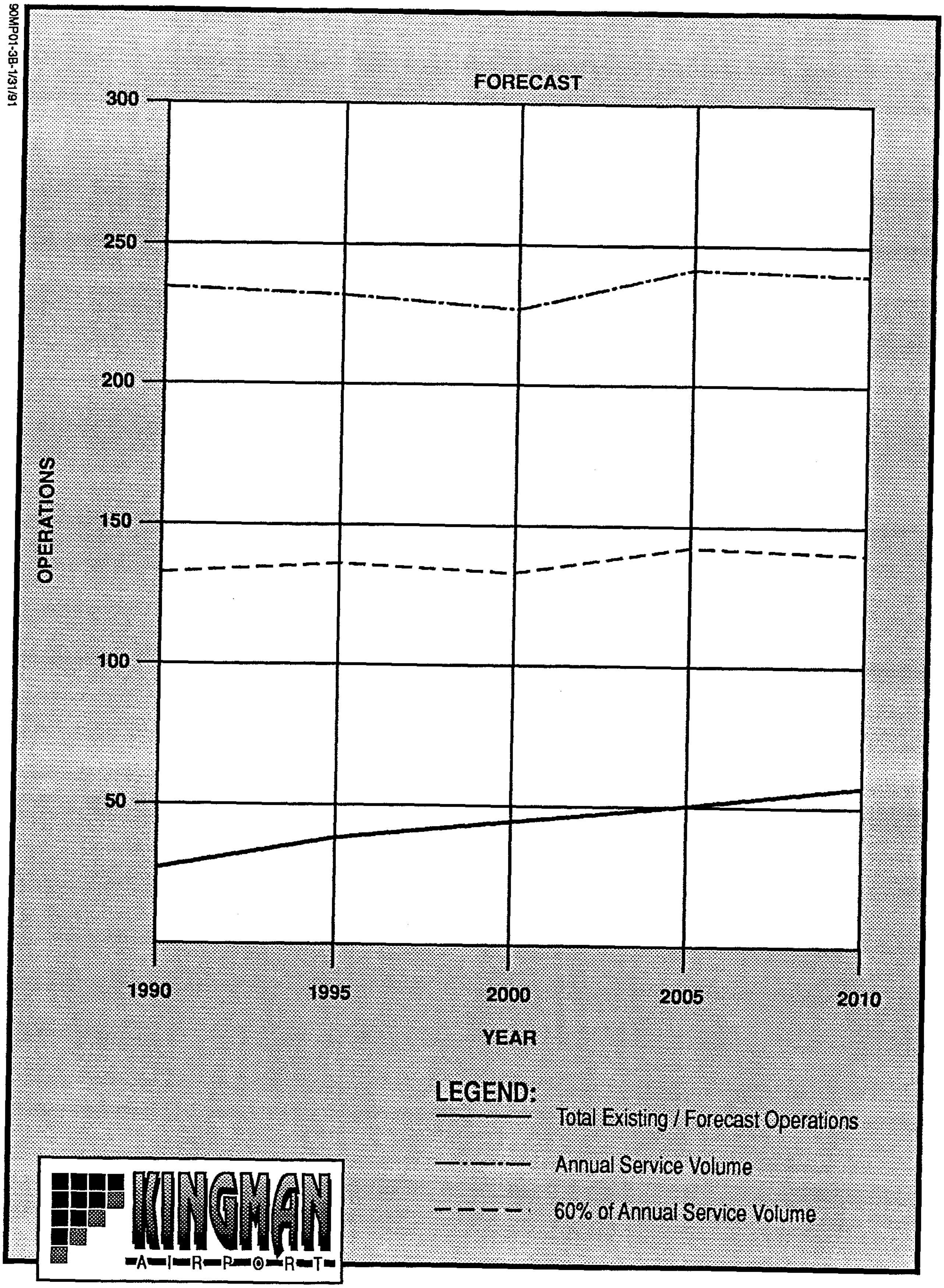


Exhibit 3B
DEMAND/CAPACITY FORECAST

presently using Kingman Airport would be considered Categories A or B (approach speeds less than 121 knots), with infrequent use by Category C aircraft (approach speeds less than 141 knots).

The advisory circular also indicates six *Airplane Design Groups* (ADG) which categorize aircraft according to their physical size. The airplane's wingspan is the principal characteristic affecting the design standard. Airplane design groups range from ADG I for small aircraft with wingspans less than 49 feet to ADG VI for the largest air carrier and cargo aircraft. Aircraft using Kingman Airport would be considered ADG I, II, and III (wingspans less than 118 feet).

Airports are divided into two major design classifications: *Utility* and *Transport*. A *Utility Airport* is an airport designed, constructed and maintained to serve airplanes in Aircraft Approach Category A and B. This type of airport accommodates small, single-engine and small twin-engine airplanes, less than 12,500 pounds gross weight, used for personal and business purposes. Two subdivisions of this airport type are *Basic Utility*, which supports mainly ADG I size aircraft and *General Utility*, which supports ADG II and III size aircraft. Precision instrument approach systems are usually not planned for Basic Utility airports but are considered for runways serving ADG III aircraft in the General Utility category.

A *Transport* Airport is an airport designed, constructed, and maintained to serve airplanes in Aircraft Categories C and D. Precision instrument approach capability is normally planned for airports in this category.

As indicated in the forecast section, general aviation operations and the fleet mix are expected to change slightly through the planning period with aircraft in ADG III increasing as a percentage of the operational fleet mix at Kingman Airport. The airport is expected to be in greater demand for small and medium size business jet and larger commercial service aircraft. Ultimate planning should be to maintain a Transport runway designed to accommodate Aircraft Design Group III, Approach Category C aircraft, to meet the present and future aviation demand.

The following paragraphs will describe the extent of facilities that would be necessary to support ADG III and Approach Category C aircraft as well as accommodate the future level of activity projected for Kingman Airport throughout the planning period.

RUNWAYS

The adequacy of the existing runway system was analyzed from a number of perspectives including runway orientation, airfield capacity, runway length, and pavement strength. From this information, requirements for runway improvements were determined for the airport.

Runway Orientation

As demonstrated earlier, the two active runways are oriented to provide adequate coverage of the 12 and 15 miles per hour crosswinds at the airport and there is no requirement for another crosswind runway at the airport during the planning period.

Runway Length and Width

The previous master plan for Kingman Airport recommended a runway length of 8,980 feet to accommodate the critical aircraft (Boeing-727) anticipated at that time. The Boeing 727 is an older commercial service aircraft that is being phased out of the inventory in favor of quieter, more fuel efficient aircraft with shorter takeoff and landing characteristics. The critical aircraft for Kingman Airport will probably be the Boeing 737. The oldest and most demanding model of this aircraft would require a runway length of 7,800 feet in order to meet the maximum gross weight takeoff condition. It is recommended that the length of Runway 3-21 be extended to 7,800 feet by the end of the planning period. Table 3E presents the runway lengths required for specific aircraft types.

The design standard width for a runway serving ADG III aircraft is 100 feet. The existing primary runway, Runway 3-21, has a width of 150 feet while Runway 17-35 has a width of 75 feet. The existing runway widths should meet the needs of the airport during the planning period.

Runway Pavement Strength

Runway 3-21 has a rated pavement strength of 45,000 pounds SWL, 85,000 pounds DWL, and 125,000 pounds DTWL. To meet the projected aircraft strength needs of the future, the pavement strength of Runway 3-21 should be increased to 150,000 pounds DWL by the end of the planning period.

TABLE 3E
Runway Length Requirements
Kingman Airport

Aircraft Types	Percent of Aircraft Type	Required Runway Length (FT)
Small (less than 10 seats)	75	3,900
	95	4,900
	100	5,300
Small (more than 10 seats)	100	5,300
Large (less than 60,000 lbs)	75(1)	6,900
	75(2)	9,500
	100(1)	9,200
	100(2)	11,200
Aircraft more than 60,000 lbs.	-	6,200
Boeing 737-300 (3)	-	6,700
Boeing 737-200 (4)	-	7,750
Recommended Runway Length		7,800

Source: FAA AC 150/5300-13, September 1989
Notes:
(1) 60% useful load
(2) 90% useful load
(3) Boeing 737-300/400/500 - Airplane characteristics for airport planning, July 1990. Data obtained for an aircraft with 20,000 lb thrust engines at 114,000 lbs gross weight. Runway length adjusted for higher temperatures.
(4) Boeing 737-200 data obtained for maximum gross weight and JT87D-17R engines. Runway length adjusted for higher temperature.

TAXIWAYS

The existing taxiway widths vary from 75 to 150 feet. The parallel taxiway for Runway 3-21 is 75 feet in width. The appropriate width for all taxiways on an airport designed for ADG III aircraft is 50 feet. The existing taxiway widths are more than adequate to meet future demands. All planned exit taxiway construction should be designed to the 50 foot minimum width.

The partial parallel taxiway for Runway 17-35 should be extended to a full parallel taxiway in the short term development period. The parallel taxiway to Runway 3-21 should be extended to 7,800 feet along with the proposed runway extension (by the end of the 20 year planning period). The width of the parallel taxiway extensions would be 50 feet. The strength of the parallel and connecting taxiways should be the same as the strength of the runways they support. Facility Requirement analyses also indicated a need for an additional connecting taxiway sometime during the short term development period, and two additional connecting taxiways by the end of the planning period.

NAVIGATIONAL AIDS AND LIGHTING

Airport and runway navigational aid requirements are based on DOT/FAA Handbook 7031.2B, **Airway Planning Standard Number One,** and FAA Advisory Circular 150/5300-13, **Airport Design Guidelines.**

Navigational aids provide precision or non-precision guidance to runways or the airport. The basic difference between a precision and nonprecision navigational aid is that the former provides electronic descent, alignment (course), and position guidance, while the nonprecision navigational aid provides only alignment and position information. The necessity of such equipment is usually determined by design standards predicated on safety considerations and operational needs. The type, purpose, and volume of aviation activity expected at the airport are factors in the determination of the airport's eligibility for FAA funded navigational aids.

Candidacy for a precision instrument landing system (ILS) funded through the Airport Improvement Program is established when the number of Annual Instrument Approaches to the airport reaches a specified number. Of course the airport may wish to purchase a precision instrument approach system with local funds and thereby avoid the requirement to establish candidacy for a federally funded system. Although the number of forecast instrument approaches conducted at the airport is low, the installation of an ILS (or Microwave Landing System) should be pursued as long as the airport is served by a commercial carrier.

The existing landing aids at the airport are the Visual Approach Slope Indicators (VASI) on Runway 3-21 and the Precision Approach Path Indicators (PAPI) located on Runway 17-35. There is a nonprecision instrument approach procedure to Runway 21 with circling approaches to the other runways. There is a VOR/DME navigational aid located on the Kingman Airport. The addition of Runway End Identification Lights (REIL) and Distance Remaining Markers on Runway 3-21 are the only additional navaids required to provide a complete runway navaid system for Kingman Airport.

Runway 03-21 is marked as a nonprecision runway while Runway 17-35 has visual markings. If the airport secures a precision instrument landing system (ILS/MLS), then Runway 3-21 must be marked accordingly (precision markings). At the time that Runway 3-21 is extended to 7,800 feet, lighted distance remaining markers should be added to the runway extension.

Medium Intensity Runway Lights (MIRL) are installed on both runways. MIRL should also be added to the proposed extension to Runway 3-21. Some of the taxiways are lighted while others are not. Medium Intensity Taxiway Lighting (MITL) should be installed on all exit and parallel taxiways, including those that are constructed during the planning period.

AIR TRAFFIC CONTROL TOWER

The existing and forecast operational levels at Kingman Airport do not qualify for the construction of an FAA Air Traffic Control Tower (ATCT) under the existing or proposed installation criteria (FAA CFR 170). The airport may wish to obtain an ATCT through a contract arrangement with a private company or petition FAA for a waiver of the criteria. In any event, an area should be reserved on the airport for establishment of an ATCT at some future date.

Exhibit 3C summarizes the airside facility requirements throughout the planning period.

LANDSIDE FACILITY REQUIREMENTS

COMMERCIAL SERVICE

The capacity of the existing air carrier terminal area facilities were calculated and compared to the forecast terminal area demand for the airport. The areas analyzed include the passenger terminal building, airline gate positions, terminal apron area, and automobile parking facilities. The capacities of each of these terminal components were evaluated in relation to forecast demand to determine the overall adequacies of each component. Deficiencies in capacity were identified to define future needs of the terminal area.

Terminal Building

The existing air carrier passenger terminal building was evaluated based on planning guidelines relating to its major functional elements as presented in FAA AC 150/5360-9, **Planning and Design of Airport Terminal Facilities at Non-hub Locations** and AC 150/5360-13, **Planning and Design Guidelines for Airport Terminal Facilities.** The methodology used in the analysis of the terminal building involved comparing forecast peak hour passenger demands, enplanements and operations, with FAA recommendations for sizing terminal functional areas. These requirements were then compared with existing terminal building facilities to determine the ability of the existing terminal to meet these requirements.

The evaluation process emphasized the primary terminal building areas that are most affected by peaking. **Table 3F** indicates the existing capacity of the major components of the terminal building followed by the anticipated demand for space through the year 2010. As indicated, there are several areas within the passenger terminal building that would currently be considered deficient.

The current commercial service carrier, Mesa Airlines, is not required to comply with all of the security requirements established for certificated air carriers. It is important to note, however, that the security requirements for all airlines involved in handling passengers are undergoing significant changes. Although not presently required under existing security guidelines, a Departure Lounge and Security Device are included in **Table 3F** for the future development of the airport.

Two of the most important functional areas in the existing terminal that should be addressed early in future terminal expansion or new

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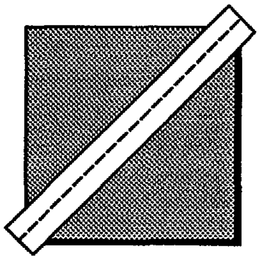
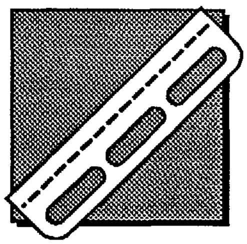
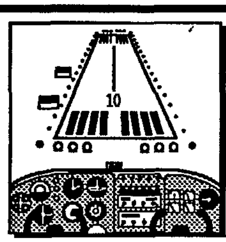
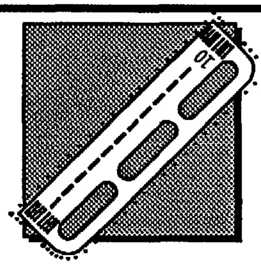
	EXISTING	SHORT TERM	ULTIMATE
RUNWAYS 	**Runway 3-21** 6831' x 150' 45,000 lbs SWL 85,000 lbs DWL 125,000 lbs DTWL **Runway 17-35** 6724' x 75' 22,000 lbs SWL 60,000 lbs DWL	**Runway 3-21** Same 100,000 lbs DWL **Runway 17-35** Same	**Runway 3-21** 7800' x150' 150,000 lbs DWL **Runway 17-35** Same
TAXIWAYS 	**Parallel Taxiway 3-21** 6650' x 75' **Partial Parallel 17-35** 2850' x 75' **Partial Parallel 7-25** 2350' x 75' **Terminal Taxiway** 2800' x 75' **Connecting Taxiways** 7	**Parallel Taxiway 3-21** Same **Parallel Taxiway 17-35** 6724' x 75' **Partial Parallel 7-25** Same **Terminal Taxiway** Same **Connecting Taxiways** 8	**Parallel Taxiway 3-21** 7800' x 75' **Parallel Taxiway 17-35** Same **Partial Taxiway 7-25** Same **Terminal Taxiway** Same **Connecting Taxiways** 10
NAVIGATIONAL AIDS 	VOR/DME **Runway 3-21** VASI-2 **Runway 17-35** PAPI	**Runway 3-21** ILS/MLS **Runway 17-35** Same	**Runway 3-21** Same **Runway 17-35** REIL
LIGHTING and MARKING 	**Runway 3-21, 17-35** MIRL **Parallel Taxiway 3-21** Partial MITL **Partial Parallel Twy.17-35** None **Terminal Taxiway** Partial MITL **Connecting Taxiways** None	**Runway 3-21, 17-35** Same **Parallel Taxiway 3-21** MITL **Parallel Taxiway 17-35** MITL **Terminal Taxiway** MITL **Connecting Taxiways** MITL	**Runway 3-21, 17-35** HIRL,Same **Partial Taxiway 3-21** Same **Parallel Taxiway 17-35** Same **Terminal Taxiway** Same **Connecting Taxiways** MITL

KINGMAN AIRPORT

Exhibit 3C
AIRSIDE FACILITY REQUIREMENTS

development are the baggage claim area and counter space. There is also an existing demand for a larger restaurant facility and space for airport management. Although space for airport management is not provided in the existing terminal, the Mohave County Airport Authority intends to move from its present location to the new airport terminal after facilities are developed that could adequately accommodate them.

TABLE 3F
Passenger Terminal Building Capacity and Demand
Kingman Airport

Existing Descriptor	1990	1995	2000	2010
PUBLIC LOBBY				
Waiting Area (SF)	443	500	500	510
Baggage Claim Lobby (SF)	0	500	500	500
Ticket Lobby (SF)	82	150	200	300
AIRLINE OPERATIONS				
Ticket Counter (LF)	6	20	20	25
Office (SF)	144	150	200	300
Baggage Preparation (SF)	225	550	600	700
BAGGAGE CLAIM				
Baggage Claim Counter (LF)	0	10	15	20
Baggage Claim Area (SF)	0	450	500	500
TERMINAL SERVICES				
Food and Beverage (SF)	910	1,200	1,500	2,000
Rental Car (SF)	200	200	200	400
Concessions (SF)	0	100	150	250
Restrooms (SF)	135	300	400	600
Gift Shop (SF)	0	200	200	400
AIRPORT MANAGEMENT (SF)	0	1,650	1,800	2,100
MISCELLANEOUS				
Storage (SF)	308	400	400	400
Mechanical (SF)	193	900	900	1,000
DEPARTURE LOUNGE(1)				
Security (Screening Device)	0	1	1	1
Holding Area (SF	0	300	350	450
TOTAL TERMINAL BUILDING (SF)(2)	2,640	7,300	8,100	10,000

Notes: (1) Not required under existing security requirements.
(2) Does not include Departure Lounge requirements. Totals rounded to nearest 100.
LF = Linear Feet
SF = Square Feet

Airline Gate Positions

An analysis of forecast passenger enplanements and the anticipated number of airlines expected to serve the airport indicates that the addition of one gate position would meet the future demand anticipated during the planning period. The size of the gate position is determined by the wingspan of the aircraft. The apron opposite the terminal building is sufficient in size to accommodate the anticipated gate expansion.

Automobile Parking

Automobile parking requirements have been determined for the passenger terminal building and include public parking, employee parking, and rental car spaces. These requirements were determined based on an evaluation of existing airport and user needs, and its comparison with industry standards.

The requirements for public vehicle parking are based on the number of forecast enplaned passengers, and are calculated by using a planning average for non-hub airports. This average is based on a sample of 24 hour use at non-hub airports nationwide. In addition, parking space requirements were increased to accommodate the restaurant facilities in the terminal as it is anticipated that the restaurant will attract industrial park employees. Using 350 square feet per parking space determines the total parking area. **Table 3G** provides the automobile parking requirements for the terminal building throughout the planning period.

A summary of the passenger terminal facilities are listed on **Exhibit 3D.**

TABLE 3G
Automobile Parking Requirements - Terminal Area
Kingman Airport

	Parking Spaces			
Vehicle Use	1995	2000	2005	2010
PUBLIC				
Long Term	10	10	10	10
Short Term	25	37	47	51
Subtotal	35	47	57	61
RENTAL CAR	7	10	11	14
EMPLOYEE	6	10	12	15
TOTAL	**48**	**67**	**80**	**90**
SPACE REQUIREMENTS (SY)[1]	1,900	2,600	3,100	3,500

[1] Totals rounded to nearest 100 yards.

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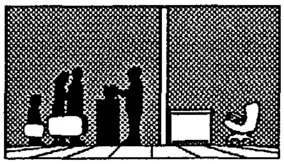
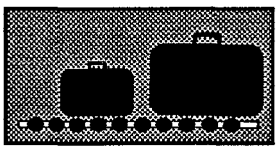
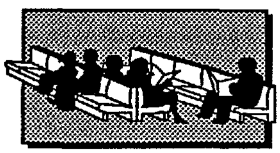
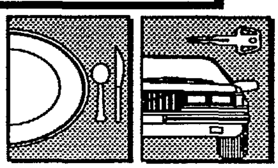
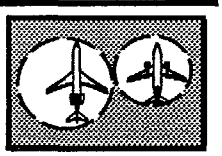
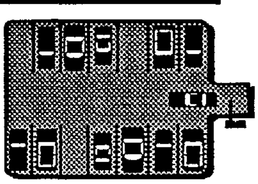
		EXISTING	1995	2000	2010
AIRLINE COUNTER/OFFICE 	Ticket Counter (Ln. Ft.)	6	20	20	25
	Ticket Office (Sq. Ft.)	144	150	200	300
	Operations Area (Sq. Ft.)	225	550	600	700
BAGGAGE CLAIM 	Claim Counter (Ln. Ft.)	0	10	15	20
	Claim Area (Sq. Ft.)	0	450	500	500
PUBLIC USE AREA 	Waiting Area (Sq. Ft.)	443	500	500	510
	Ticket Lobby (Sq. Ft)	82	150	200	300
	Baggage Claim Lobby (Sq. Ft.)	0	500	500	500
VENDORS 	Restaurant (Sq. Ft.)	910	1200	1500	2000
	Rental Car (Sq. Ft.)	200	200	200	400
	Concessions (Sq. Ft.)	0	100	150	250
	Gift Shop (Sq. Ft.)	0	200	200	400
TERMINAL GATE POSITIONS 	Gates	1	1	1	2
	Apron Area (Sq. Yd.)	20,800	10,000	10,000	20,000
AUTO PARKING 	Public	34	35	47	61
	Rental	10	7	10	14
	Employee	10	6	10	15

KINGMAN AIRPORT

Exhibit 3D
PASSENGER TERMINAL
FACILITY REQUIREMENTS

GENERAL AVIATION AREA

Hangars and Hangar Apron Area

The demand for hangar facilities is dependent upon the number and types of aircraft expected to be based at the airport. Actual percentages of based aircraft desiring hangar space will vary across the country as a function of local climatic conditions, airport security and owner preferences. The percentage of based aircraft which are hangared normally ranges from approximately 30 percent in southern states to over 80 percent in northern states and areas subject to extreme weather conditions. In the state of Arizona, the percentage of hangared aircraft often approaches the percentages found in the northern states. Based on the inventory of based aircraft at Kingman Airport, approximately 45 percent of the aircraft are currently hangared. While conventional hangars are located on the airport, most of the space is currently being used for maintenance purposes. At the present time, all shades and T-Hangars are occupied. For planning purposes, it is anticipated that the percentage of hangared aircraft will grow from the present 45 percent to approximately 70 percent of all based aircraft. Additionally, it was estimated that 70 percent of the single engine piston, 40 percent of the twin-engine piston and 100 percent of the turboprop, jet and helicopters will prefer to be hangared. Twins and single engine aircraft will provide most of the demand for T-Hangars and shades. The sizing of conventional hangar facilities was based on 800 square feet for an ultralight, 1,500 square feet for rotary aircraft, 2,000 for twin engine and 2,700 square feet for turbine aircraft.

Shade and T-hangar dimensions are based on 1,225 feet per aircraft. For planning purposes, the service hangar area was estimated to be 20 percent of the total hangar storage area. **Table 3H** compares the current hangar storage capacity with demand.

As indicated in **Table 3H**, conventional hangar storage will be adequate until 2005, however, Shade and T-hangars are in immediate demand. Although hangars are required during the planning period, the existing apron will accommodate the expansion in facilities well past the planning period. It is possible, however, that additional apron may be required to support relocated or new facilities, a subject that will be reviewed in the next chapter.

TABLE 3H
Forecast Hangar and Hangar Apron Requirements
Capacity and Demand
Kingman Airport

	Existing	Forecast			
	1990	1995	2000	2005	2010
BASED AIRCRAFT					
Single Engine	51	59	74	88	102
Multi-Engine Piston	15	16	19	21	23
Twin Engine Turboprop	0	1	2	4	8
Jet	0	0	1	3	4
Rotorcraft	2	3	5	5	8
Other	10	12	12	13	11
Total	**78**	**91**	**113**	**134**	**156**
HANGARED AIRCRAFT	**35**	**46**	**68**	**87**	**109**
CONVENTIONAL HANGAR POSITIONS					
Single	11	12	12	13	11
Twin	0	0	0	0	0
Turboprop	0	1	2	4	8
Jet	0	0	1	3	4
Rotary	2	3	5	5	8
Total	**13**	**16**	**20**	**25**	**31**
T-HANGAR POSITIONS/SHADES	22	30	48	62	78
CONVENTIONAL HANGAR AREA (SF)					
Aircraft Storage	46,375	16,800	25,200	36,800	53,200
Aircraft Maintenance	12,000	4,200	6,300	9,200	13,300
Total	**58,375**	**21,000**	**31,500**	**46,000**	**66,500**
SHADE/T-HANGAR AREA (SY)	**2,613**	**4,011**	**6,511**	**8,455**	**10,644**
TOTAL HANGAR APRON AREA (SQ YD)(1)					
Conventional	10,306	3,700	5,600	8,200	11,800
Shade & T-Hangar	5,227	8,000	13,000	16,900	21,300
Total	**15,533**	**11,700**	**18,600**	**25,100**	**33,100**

Note: (1) Does not include apron existing at other areas on the airport.

Aircraft Parking Apron

Local apron area should be provided for at least the number of based aircraft not requiring hangar storage. Available aircraft tiedown positions on the airport have been estimated at 136. Due to the relatively large apron area at Kingman Airport, additional tiedown positions could be made available should they be necessary for use by based and/or transient aircraft. At the present time, there are approximately 43 based aircraft using paved tiedown positions. **Table 3I** compares the capacity to demand for local apron space.

At Kingman Airport, the number of itinerant spaces required was determined to be approximately 50 percent of the busy-day itinerant landing operations or 37 percent of the busy-day itinerant operations. The FAA planning criterion of 3,240 square feet per itinerant aircraft was applied to the number of itinerant spaces to determine future itinerant ramp requirements. The results of this analysis are also presented in **Table 3I**. With more than enough apron area to accommodate the existing and future demand, it appears that both local and transient tiedown facilities will be adequate throughout the planning period.

TABLE 3I
Forecast Apron Requirements
Capacity and Demand
Kingman Airport

	Existing	Forecast			
	1990	1995	2000	2005	2010
LOCAL					
Local Parking Positions	136	45	45	47	47
Apron Area (SY)	40,800	13,800	13,800	14,100	14,100
TRANSIENT					
Busy Day Operations	82	162	187	213	233
Itinerant Operations	62	120	138	158	172
Busy Day Landings	31	60	69	79	86
Transient Parking Positions	100	30	35	39	43
Apron Area (SY)	160,000	10,600	12,100	13,800	15,100

SY = Square Yards

General Aviation Terminal Building

At Kingman Airport, the general aviation pilot and passenger needs are accommodated by the existing terminal building, as well as the airport's current FBO, Air'Zona. Kingman Aero Services also has facilities for use by general aviation pilots and passengers. Together, the pilot and passenger areas include lobby areas and concessions, management offices, flight planning areas, and pilots' lounge. The space demands outlined in **Table 3J** were developed from general aviation terminal building space requirement studies and should be viewed only as general guidelines.

The methodology is based on the forecast number of design hour pilots and passengers which is used in defining specific functional areas. It should be noted that space demands outlined in **Table 3J** are not limited to a separate general aviation terminal building, but may be accommodated in more than one building. The requirements outlined in **Table 3J** are based on demand levels which should be addressed in the design of new and/or reconstruction of existing facilities to assure that adequate space is provided for future general aviation needs.

Not only the amount of space is important, but the allocation of space to each area is just as important. A disproportionate allocation of space will create inefficiencies by creating unusable or under utilized areas.

In the future, commercial service security requirements may impact the relationship between general aviation and commercial service, which may result in the separation of general aviation terminal facilities from commercial service terminal facilities.

TABLE 3J
General Aviation Terminal Facilities
Kingman Airport

	Existing 1990	Forecast 1995	2000	2005	2010
Design Hour Pilots & Passengers	15	30	31	32	34
Waiting area/ Pilot's Lounge	**	450	470	480	510
Management/operations	**	90	100	100	100
Restrooms	**	50	50	50	50
Concessions	**	250	250	260	280
Circulation, Mechanical	**	840	860	890	940
Total Terminal Space	N/A	1,680	1,720	1,780	1,880

** Space Requirements provided By FBO
N/A = Not Applicable

Source: Aviation Demand and Airport Facility Requirements Forecasts for Medium Air Transportation Hubs through 1980, FAA, January 1980.

Automobile Parking

The requirements for general aviation automobile parking are largely dependent upon the level of general aviation operations in addition to the type of general aviation facilities and activities associated with the airport.

In order to provide adequate parking facilities for the conventional hangars, shade and T-hangars as well as FBO and other aviation related businesses, a method was designed based upon the number of based aircraft at an airport. The methodology assumes that no more than 30 percent of the airport's based aircraft will be airborne at any one time, thereby reducing the number of vehicle parking requirements to a reasonable amount. The total automobile parking area appears sufficient until the later stages of the planning period. **Table 3K** reflects automobile parking requirements for the general aviation related operations of the airport.

TABLE 3K
Public Vehicle Parking Requirements
Capacity and Demand
Kingman Airport

	Existing	Forecast			
	1990	1995	2000	2005	2010
Design Hour Passengers	15	30	31	32	34
Terminal Vehicle Spaces*	22	39	40	42	44
Parking Area (SY)	860	1,520	1,570	1,620	1,720
Based Aircraft	78	91	113	134	156
General Aviation Spaces	65(1)	27	34	40	47
Parking Area (SY)	2,530	1,050	1,322	1,555	1,827
Total Parking Area Requirements (SY)	3,390	2,570	2,892	3,175	3,547

* Source: Aviation Demand and Airport Facility Requirements Forecasts for Medium Air Transportation Hubs through 1980, January 1980.

(1) Approximately 50 percent are unpaved parking areas.

SUPPORT FACILITIES

Various facilities that do not logically fall within classifications of airfield, terminal building or general aviation requirements, have been identified for inclusion in this Master Plan. Facility requirements have been analyzed and identified for the following facilities.

- Airport Maintenance and Administration
- Airport Rescue and Fire Fighting
- Utilities
- Fuel Storage

Airport Maintenance and Administration

The current needs of airport administration appear to be satisfied in the present facility. However, it is the intent of the Mohave County Airport Authority to provide this building to the City of Kingman in order to establish a fire department at this location. It was indicated in an earlier section of this chapter that adequate space for airport administration has been planned in the commercial service terminal building when expansion/construction of this facility is complete. In the interim, the existing facility can accommodate airport administration personnel.

However, the airport maintenance section does not have a facility to store vehicles or maintain a minor repair shop. The long term needs of the airport indicate that such a facility will become necessary in the near term. A 2,000 square foot facility should be provided initially with the capability for expansion, if future requirements should dictate. Planning for such a facility will be addressed in the next chapter.

Aircraft Rescue and Firefighting

Because the Kingman Airport maintains a limited airport operating certificate under Federal Aviation Regulations Part 139, it must be capable of providing standby equipment and personnel for aircraft rescue and firefighting (ARFF) to "air carrier aircraft", for any air "carrier operations." An air carrier aircraft, under Part 139, is defined as an aircraft with a seating capacity of more than 30 passengers that is being operated by an air carrier. An air carrier operation means the takeoff or landing of an air carrier aircraft and includes the period of time from 15 minutes before and until 15 minutes after the takeoff or landing. With a limited certificate, all such air carriers must obtain prior permission and give 24 hour notice. In accordance with Part 139, Kingman Airport's existing rescue and firefighting capabilities satisfy the specific requirements of Index A. Future airport plans should maintain ARFF capabilities. Forecasts do not project a need to increase the Airport's ARFF Index.

Fuel Storage

Fuel is stored in two locations on the airport: underground tanks under the fuel island adjacent to the terminal, and above ground tanks near the northeast end of Flightline Drive. The fuel storage facilities and fuel trucks are owned and operated by the FBO's. Future fuel storage requirements were determined for the airport following an analysis of fuel utilization characteristics. Based upon data obtained from the FBO's, average fuel consumed is approximately three gallons per operation. This ratio can be expected to increase as the size of the fleet mix increases.

Fuel storage requirements are based on monthly fuel storage consumption and the amount in reserve. A two-month supply is reasonable under normal conditions, however, in times when fuel supplies are critical, a larger reserve may be necessary to avoid shortages.

For planning purposes, a two-month supply of fuel was used to determine the required fuel storage facilities throughout the planning period. As shown in **Table 3L**, the existing fuel storage capacity will be adequate throughout the planning period.

Exhibit 3E summarizes the landside facility requirements identified in the planning process.

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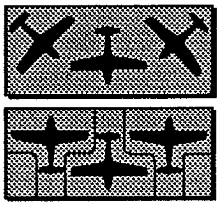
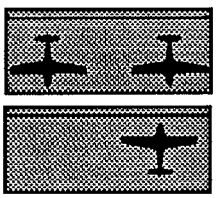
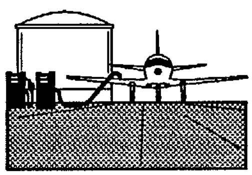
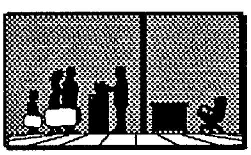
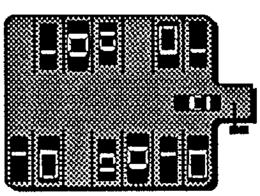
		EXISTING	1995	2000	2010
HANGARS 	Conventional Hangars	13	16	20	31
	Shade/T-Hangars	22	30	48	78
	Total Hangar Apron Area (Sq. Yd.)	15,533	11,700	18,600	33,100
APRON TIE-DOWNS 	Local Apron Positions	136	45	45	47
	Transient Apron Positions	100	30	35	43
	Total Apron Area (Sq. Yd.)	160,000	10,600	12,100	15,100
FUEL STORAGE 	80/87 Octane (Gallons)	10,000	0	0	0
	100 Low Lead (Gallons)	34,000	10,000	12,400	19,200
	Jet A (Gallons)	36,000	12,000	14,800	23,400
	Total Gallons	80,000.	22,000	27,200	42,600
GENERAL AVIATION TERMINAL 	Waiting Area/ Pilots Lounge	FBO	450	470	510
	Operations	FBO	90	100	100
	Concessions	FBO	250	250	280
	Total Terminal Area (Sq. Ft.)		1680	1720	1880
AUTO PARKING 	Terminal	22	39	40	44
	General Aviation	65	27	34	47
	Total Parking Area (Sq. Yd.)	3390	2570	2892	3547

KINGMAN
AIRPORT

Exhibit 3E
LANDSIDE FACILITY REQUIREMENTS

TABLE 3L
Fuel Storage Requirements
Capacity and Demand
Kingman Airport

	Existing 1990	1995	2000	2005	2010
Annual fuel sales (gal)	86,000	-	-	-	-
Monthly fuel sales (gal)	7,170	-	-	-	-
Annual Operations	27,021	37,800	44,000	50,200	56,800
Average monthly Operations	2,250	3,150	3,670	4,180	4,730
Average fuel ratio	3.19	3.50	3.70	4.00	4.50
Monthly fuel storage requirements	7,200	11,000	13,600	16,700	21,300
Fuel Storage Capacity Required (based on two month's supply)	80,000	22,000	27,200	33,400	42,600

Utilities

The existing airport utilities were evaluated to determine their adequacy to meet future demands of the airport and any projected on-airport development. It appears the airport has adequate utilities available through the planning period, dependent upon expansion or relocation of any facilities. This subject will be addressed again once the alternatives for future development have been addressed and a future facilities plan for the airport has been selected.

OTHER SERVICES

Kingman Airport is located in an area of Arizona that is subject to intense weather conditions from time to time during the year. When the National Weather Service (NWS) reduced the number of weather reporting stations in the United States, Kingman's ability to provide current weather conditions was reduced. In an effort to increase the number of operating weather reporting stations, the NWS, in conjunction with the FAA, has begun a program to install automated weather stations at selected airports throughout the United States.

At the present time, the NWS has selected nearly 1,300 sites for installation of the Automated Surface Observation System (ASOS), a sophisticated weather reporting system. However, Kingman Airport has not been selected as one of the ten sites to receive ASOS in Arizona.

There is another alternative that could provide a basic weather reporting system to pilots landing at Kingman Airport called the Automated Weather Observing System (AWOS). AWOS would be capable of transmitting important weather information to pilots 24 hours a day, especially during hours when the Unicomm is not operating. With some equipment modifications, the AWOS could be automatically transmitted over the TVOR at the airport.

SUMMARY

Exhibits 3C, 3D and 3E summarize the facility requirements determined in this chapter. The next step in the master plan process is to determine the growth pattern that facilities should take, a plan that should provide the flexibility to grow at a faster or slower rate based upon existing conditions at the airport. In the next chapter several alternatives for airport development will be reviewed with a recommendation provided on the course of development the airport should follow throughout the planning period.